PALOUSE HILLS ADVENTIST SCHOOL (PWS 2290027)
SOURCE WATER ASSESSMENT DRAFT REPORT

October 4, 2001

State of Idaho
Department of Environmental Quality

Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This assessment is based on a land use inventory of the designated assessment area, sensitivity factors associated with the wells, and aquifer characteristics.

This report, *Source Water Assessment for Palouse Hills Adventist School,* describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The Palouse Hills Adventist School drinking water system consists of one well. A review of the State drinking water sampling data (DWIMS) indicates that there have been no detections of contamination within this system since records began being kept in 1996. There are no recorded detections of inorganic contaminants (IOC) like metals or nitrate, volatile organic contaminants (VOC) like petroleum products or synthetic organic contaminants (SOC) like pesticides. The above notwithstanding, Palouse Hills Adventist School's well is only 165 feet deep. Its shallowness combined with questionable construction standards make the well highly vulnerable if contaminates are introduced to the wellhead or its ground water.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

DEQ's records indicate that although the high IOC (iron) content in the local ground water is present it is being removed via a commercial water softener process prior to water sampling points. Therefore this parameter does not show up in sample data. Any spills from Highway 8 or the railroad should be carefully monitored and dealt with. Other practices aimed at reducing the leaching of chemicals from agricultural land within the designated source water areas should be implemented. Most of the designated areas are outside the direct jurisdiction of the Palouse Hills Adventist School. Partnerships with state and local agencies and industry groups should be established and are critical to success. Due to the time involved with the movement of ground water, source water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. Source water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the local Soil Conservation District, and the Natural Resources Conservation Service.

A community with a fully developed source water protection program will incorporate many strategies. For assistance in developing protection strategies please contact the Lewiston Regional Office of the Idaho Department of Environmental Quality or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR PALOUSE HILLS ADVENTISTS SCHOOL, LATAH COUNTY, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this source means.** A map showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are attached. The list of significant potential contaminant source categories and their rankings, used to develop this assessment, is also attached.

Level of Accuracy and Purpose of the Assessment

The Idaho Department of Environmental Quality (DEQ) is required by the U.S. Environmental Protection Agency (EPA) to assess the over 2,900 public drinking water sources in Idaho for their relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area, sensitivity factors associated with the wells, and aquifer characteristics. All assessments must be completed by May of 2003. The resources and time available to accomplish assessments are limited. Therefore, an in-depth, site-specific investigation to identify each significant potential source of contamination for every public water system is not possible. **This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should not be used as an absolute measure of risk and they should not be used to undermine public confidence in the water system.**

The ultimate goal of this assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. The Idaho Department of Environmental Quality (DEQ) recognizes that pollution prevention activities generally require less time and money to implement than treating a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The decision as to the amount and types of information necessary to develop a source water protection program should be determined by the local community based on its own needs and limitations. Wellhead or source water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

The well at Palouse Hills Adventist School usually accommodates approximately 60 students and staff from two drinking water connections. Palouse Hills Adventist School is located in Latah County less than one mile east of Moscow and one block south of Highway 8 and the Burlington Northern Railroad (Figure 1).

No detections of microbials, IOC, SOC or VOC have been recorded. DEQ's records indicate that although the high IOC (iron) content in the local ground water is present it is being removed via a commercial water softener process prior to water sampling points. Therefore this parameter does not show up in sample data.

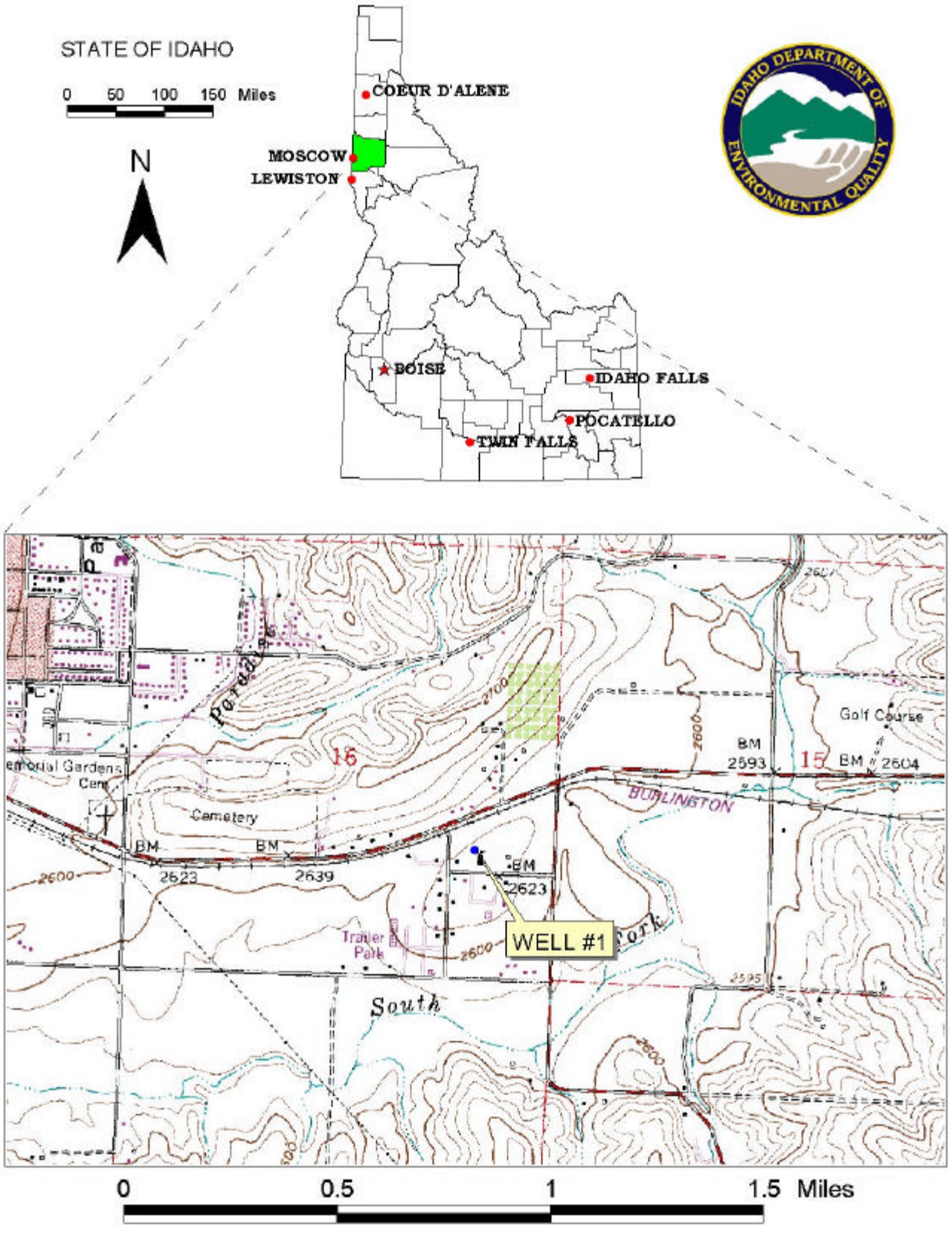
Defining the Zones of Contribution--Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time of travel zones (zones indicating the number of years necessary for a particle of water to reach a well) for water in the aquifer. DEQ used a refined computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) time-of-travel (TOT) for water associated with the Wanapum aquifer in the vicinity of the Palouse Hills Adventist School. The computer model used site- specific data, assimilated by DEQ from a variety of sources including local area well logs. Influenced mainly by the relatively low flow rate and the close proximity of the Moscow basin margin, the delineation area for the Palouse Hills Adventist School well is a narrow curvilinear feature extending from the wellhead to the West-Southwest (Figure 2). The actual data used by DEQ in determining the source water assessment delineation areas is available upon request.

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act and has a sufficient likelihood of releasing such contaminants at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ and from available databases. The dominant land use outside the Palouse Hills Adventist School is non-irrigated agricultural. Land use within the immediate area of the wellhead consists of the school's small campus and a major transportation corridor including a highway and a railroad.

FIGURE 1. Geographic Location of Palouse Hills Adventist School



It is important to understand that a release may never occur from a potential source of contamination provided best management practices are used at the facility. Many potential sources of contamination are regulated at the federal level, state level, or both, to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, such as educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

A two-phased contaminant inventory of the study area was conducted during May of 2000. The first phase involved identifying and documenting potential contaminant sources within the Palouse Hills Adventist School Source Water Assessment Area through the use of computer databases and Geographic Information System maps developed by DEQ. The second or enhanced phase of the contaminant inventory involved contacting the operator to validate the sources identified in phase one and to add any additional potential sources in the area.

There are four potential contaminant sites located within the delineated source water area for the Palouse Hills Adventist School well. Highway 8, the Burlington Northern Railroad, a gas station and a small engine repair shop are located in the 3-year time of travel zone for the well. If an accidental spill occurred along the transportation corridor or from the two facilities that store petrochemicals, a variety of hazardous chemicals or microbial contaminants could be added to the aquifer system. Existing contaminants of concern include IOCs, VOCs, SOCs and microbials. All of the potential contaminant sites are listed and depicted in Table 1 and Figure 2.

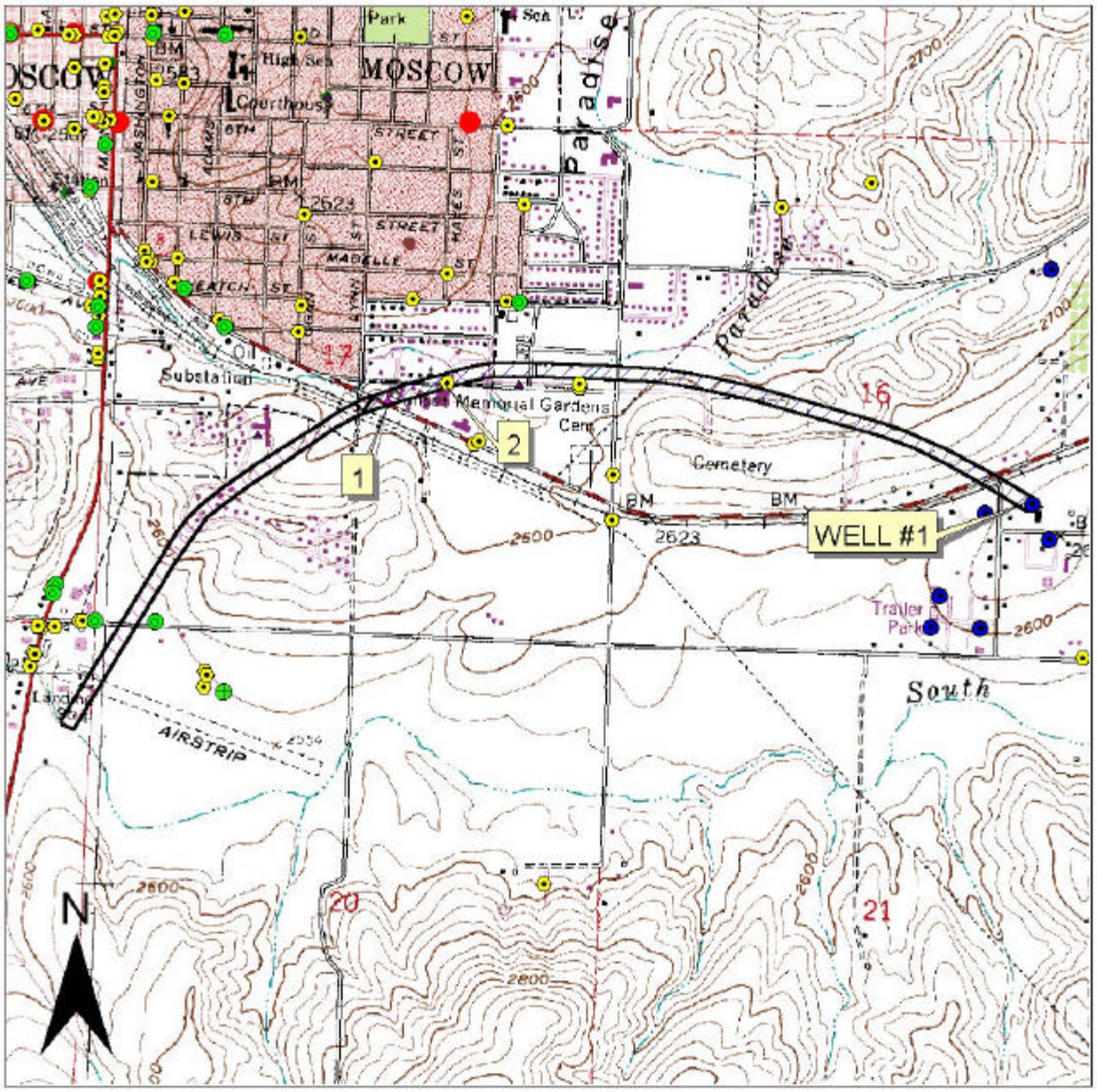
Table 1. Palouse Hills Adventist School Well, Potential Contaminant Inventory

SITE #	Source Description[1]	TOT Zone[2] (years)	Source of Information	Potential Contaminants[3]
1	Gas Station	3	Database Search	IOC,VOC, SOC
2	Small Engine Repair	3	Database Search	IOC,VOC, SOC
3	Highway 8	3	Database Search	IOC,VOC, SOC, M
4	Railroad	3	Database Search	IOC,VOC, SOC, M

[2] TOT = time-of-travel (in years) for a potential contaminant to reach the well

[3] IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical, M = microbials, SARA = Superfund Site

Figure 2. Palouse Hills Adventist School Delineation Map and Potential Contaminant Source Locations



0 0.2 0.4 0.6 0.8 1 Miles

LEGEND

Time of Travel Zones
10 (3 yr TOT)
3 (6 yr TOT)
3 (10 yr TOT)
Wellhead
Enhanced Inventory
CERCLIS Site
RICRIS Site
Dairy
LUST Site
Closed UST Site
Open UST Site
Business Mailing List
NPDES Site
Mine
AST
Toxic Release Inventory
SARA Title III Site (EPCRA)
Recharge Point
Injection Well
Group1 Site
Cyanide Site
Landfill
Wastewater Land App. Site

IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY

PWS# 2290027
WELL #1

Section 3. Susceptibility Analyses

The water system's susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for each well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

Hydrologic sensitivity is moderate for The Palouse Hills Adventist School well (Table 2). This reflects the nature of the soils being in the poor to moderately well drained class, which could facilitate the downward movement of contaminants. Neighboring well logs indicate that the well's vadose zone (zone from land surface to the water table) is composed largely of broken basalt, which may also facilitate downward movement of contaminants. The well's vadose zone also does not have the requisite 50 feet cumulative low permeability formations, which further contributes to the moderate risk rating score.

Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. The Palouse Hills Adventist School drinking water system consists of a single well that extracts ground water for students and staff. The well construction score is high risk based on limited information including a sketchy driller's log of the well. The well is quite shallow with a total depth of 165 feet. There is no information indicating if the well's casing is seated in firm bedrock, which could form a good seal if no fractures are present. The well's casing diameter is 6 inches but there is no information regarding casing thickness. It is likely that the well does not meet current Idaho Department of Water Resources requirements of 0.280 inch for 6-inch casing. It is unknown if the well meets flood protection standards.

The Idaho Department of Water Resources Well *Construction Standards Rules* (1993) require all Public Water Systems (PWSs) to follow DEQ standards as well. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works* (1997) during construction. Table 1 of the *Recommended Standards for Water Works* (1997) states that 8-inch casing requires a thickness of 0.322 inch.

Based on water chemistry data and local area well logs, the Palouse Hills Adventist School well is drawing water from the shallow Wanapum aquifer. Although this aquifer is thought to be approximately 450 feet thick in this area, the well is drawing from the uppermost 50 feet of the Wanapum aquifer, which creates additional risk for well contamination.

Potential Contaminant Source and Land Use

Although four potential contaminant sources have been identified within the well's 3 year time of travel zone, no significant water quality problems have been recorded for the Palouse Hills Adventist School well. Contaminants checked for include detections of microbials, IOCs like metals or nitrate, VOCs like petroleum products and SOCs like pesticides.

Final Susceptibility Rating

Although contaminant sources are present within the delineation zones no microbial, IOC, SOC or VOC contaminants have been recorded for the Palouse Hills Adventist School. However, the threat of contamination is substantial. These conditions combined with well construction and hydrologic information result in an overall high risk rating for IOC, SOC and VOC potential contaminant categories and a moderate risk rating for microbial contamination.

Table 2. Summary of Palouse Hills Adventist School Susceptibility Evaluation

Well	Susceptibility Scores[1]									
	Hydrologic Sensitivity	Contaminant Inventory				System Construction	Final Susceptibility Ranking			
		IOC	VOC	SOC	Microbials		IOC	VOC	SOC	Microbials
Well 1	M	H	H	H	M	H	H	H	H	M

[1]**H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility, IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical**

Section 4. Options for Source Water Protection

The susceptibility assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what the susceptibility ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require education and surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources.

An effective source water protection program is tailored to the particular local source water protection area. A community with a fully developed source water protection program will incorporate many strategies. The primary water quality issue currently facing Palouse Hills Adventist School is that of potential ground water contamination and the problems associated with managing this contamination. Although well water quality has been free of IOC, VOC, SOC and microbial contamination since records have been kept in 1996, the Palouse Hills Adventist School well is shallow and vulnerable. Any spills from Highway 8 or from the railroad should be carefully monitored. Other practices aimed at reducing the leaching of agricultural chemicals from agricultural land within the designated source water areas should be implemented. DEQ's records indicate that the high IOC (especially iron) content in the local ground water is being removed via a commercial water softener process. This procedure should be continued. Most of the designated areas are outside the direct jurisdiction of the Palouse Hills Adventist School. Partnerships with state and local agricultural agencies and industry groups should be established and are critical to success. Due to the time involved with the movement of ground water, wellhead protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. Source water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the Payette Soil and Water Conservation District, and the Natural Resources Conservation Service.

Assistance

Public water suppliers and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

Lewiston Regional DEQ Office (208) 373-0550

State DEQ Office (208) 373-0502

Website: http://www2.state.id.us/deq

Water suppliers serving fewer than 10,000 persons may contact John Bokor, Idaho Rural Water Association, at 1-800-962-3257 for assistance with wellhead protection strategies.

POTENTIAL CONTAMINANT INVENTORY
LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as Superfund is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5mg/l.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RICRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Where possible, a list of potential contaminant sites unable to be located with geocoding will be provided to water systems to determine if the potential contaminant sources are located within the source water assessment area.

References Cited

Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, 1997. "Recommended Standards for Water Works."

Idaho Department of Agriculture, 1998. Unpublished Data.

Idaho Department of Environmental Quality, 1997. Design Standards for Public Drinking Water Systems. IDAPA 58.01.08.550.01.

Idaho Department of Water Resources, 1993. Administrative Rules of the Idaho Water Resource Board: Well Construction Standards Rules. IDAPA 37.03.09.

University of Idaho, 2000. Moscow Basin Source Water Assessment. Idaho Water Resources Research Institute. University of Idaho. Moscow, Idaho. December 2000.

Attachment A

Palouse Hills Adventist School
Susceptibility Analysis
Worksheet

The final scores for the susceptibility analysis were determined using the following formulas:

1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.2)

2) 2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.35)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

Ground Water Susceptibility Report

PALOUSE HILLS ADVENTIST SCHOOL N WELL Public Water System Number 2290027 6/26/01 2:31:10 PM

1. System Construction			SCORE
Drill Date		unknown	
Driller Log Available		NO	
Sanitary Survey (if yes, indicate date of last survey)		YES 1996	0
Well meets IDWR construction standards		NO	1
Wellhead and surface seal maintained		NO	1
Casing and annular seal extend to low permeability unit		NO	2
Highest production 100 feet below static water level		NO	1
Well located outside the 100 year flood plain		NO	1
	Total System Construction Score		6

2. Hydrologic Sensitivity			
Soils are poorly to moderately drained		YES	0
Vadose zone composed of gravel, fractured rock or unknown		YES	1
Depth to first water > 300 feet		NO	1
Aquitard present with > 50 feet cumulative thickness		NO	2
	Total Hydrologic Score		4

3. Potential Contaminant / Land Use - ZONE 1A			IOC Score	VOC Score	SOC Score	Microbial Score
Land Use Zone 1A		DRYLAND AGRICULTURE	1	1	1	1
Farm chemical use high		YES	2	0	2	
IOC, VOC, SOC, or Microbial sources in Zone 1A		NO	NO	NO	NO	NO
	Total Potential Contaminant Source/Land Use Score - Zone 1A		3	1	3	1
Potential Contaminant / Land Use - ZONE 1B						
Contaminant sources present (Number of Sources)		YES	4	4	4	2
(Score = # Sources X 2) 8 Points Maximum			8	8	8	4
Sources of Class II or III leacheable contaminants or		YES	2	4	2	
4 Points Maximum			2	4	2	
Zone 1B contains or intercepts a Group 1 Area		NO	0	0	0	0
Land use Zone 1B	25 to 50% Non-Irrigated Agricultural Land		1	1	1	1
	Total Potential Contaminant Source / Land Use Score - Zone 1B		11	13	11	5
Potential Contaminant / Land Use - ZONE II						
Contaminant Sources Present		YES	2	2	2	
Sources of Class II or III leacheable contaminants or		YES	1	1	1	
Land Use Zone II	Greater Than 50% Non-Irrigated Agricultural		1	1	1	
	Potential Contaminant Source / Land Use Score - Zone II		4	4	4	0
Potential Contaminant / Land Use - ZONE III						
Contaminant Source Present		NO	0	0	0	
Sources of Class II or III leacheable contaminants or		NO	0	0	0	
Is there irrigated agricultural lands that occupy > 50% of		NO	0	0	0	
	Total Potential Contaminant Source / Land Use Score - Zone III		0	0	0	0
Cumulative Potential Contaminant / Land Use Score			18	18	18	6
4. Final Susceptibility Source Score			14	14	14	12
5. Final Well Ranking			High	High	High	Moderate